

Biomass Based RESCO for Village Industry

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Challenges of a Biomass Based RESCO

- Need a viable RESCO
- Need a viable biopower system
 - right output
 - fuel flexibility
 - convert fuel to high quality electrical and thermal power
 - fully automated
 - follow variable loads
 - meet environmental requirements
- Sustainable resource
- Need an agriculture-based productive use
- Integrate village and productive loads for maximum benefit

Biomass-based RESCO Overview

- RESCO: Shell Renewable Philippines Corporation
- Biopower system: Small Modular Biopower system
- Biomass source: Coconut shells
- Application: Provide heat and power to a coconut processing facility and nearby village
- Village: Alaminos, Philippines

Coconut Processing Facility

- Facility Operator: Alaminos Coconut Development Cooperative
- Initial Products
 - geo-textiles made from husk fiber
 - plant growing media
 - dried copra
 - soap
- Initial Throughput: 2,000 nuts per day

Coconut Shells Are An Ideal Fuel

- Plentiful
- Low moisture
- Easy to crush, size
- Feeds well
- Low ash
- High energy density



Several Thousand Coconut shells

Several Thousand Coconut Husks



A Husk is 30% Coir Fiber



The Fiber Can Be Woven Into Nets



Nets Can Be Joined To Form Geo-textile Products



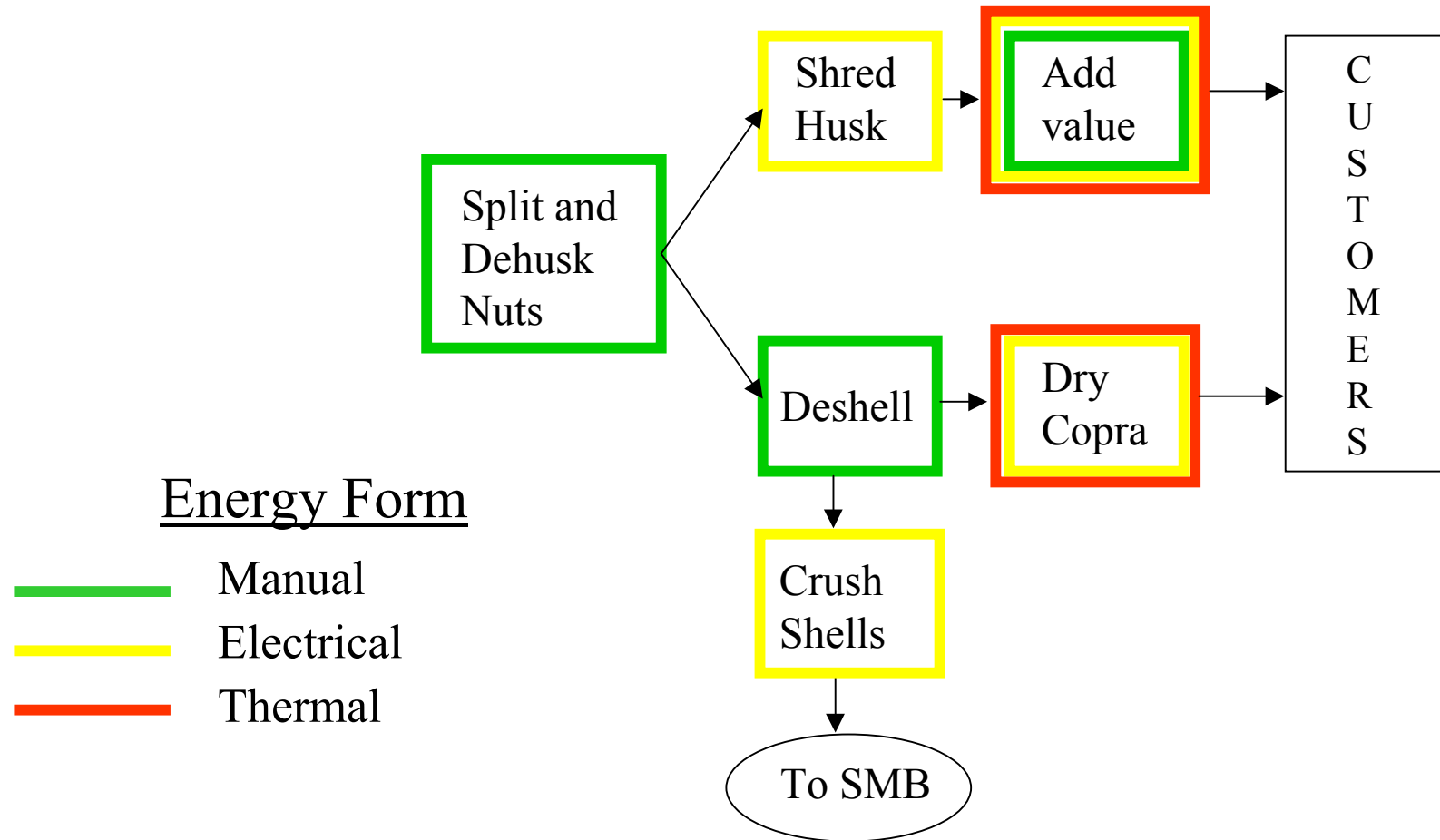
Coir Dust Is The Other 70% of the Husk



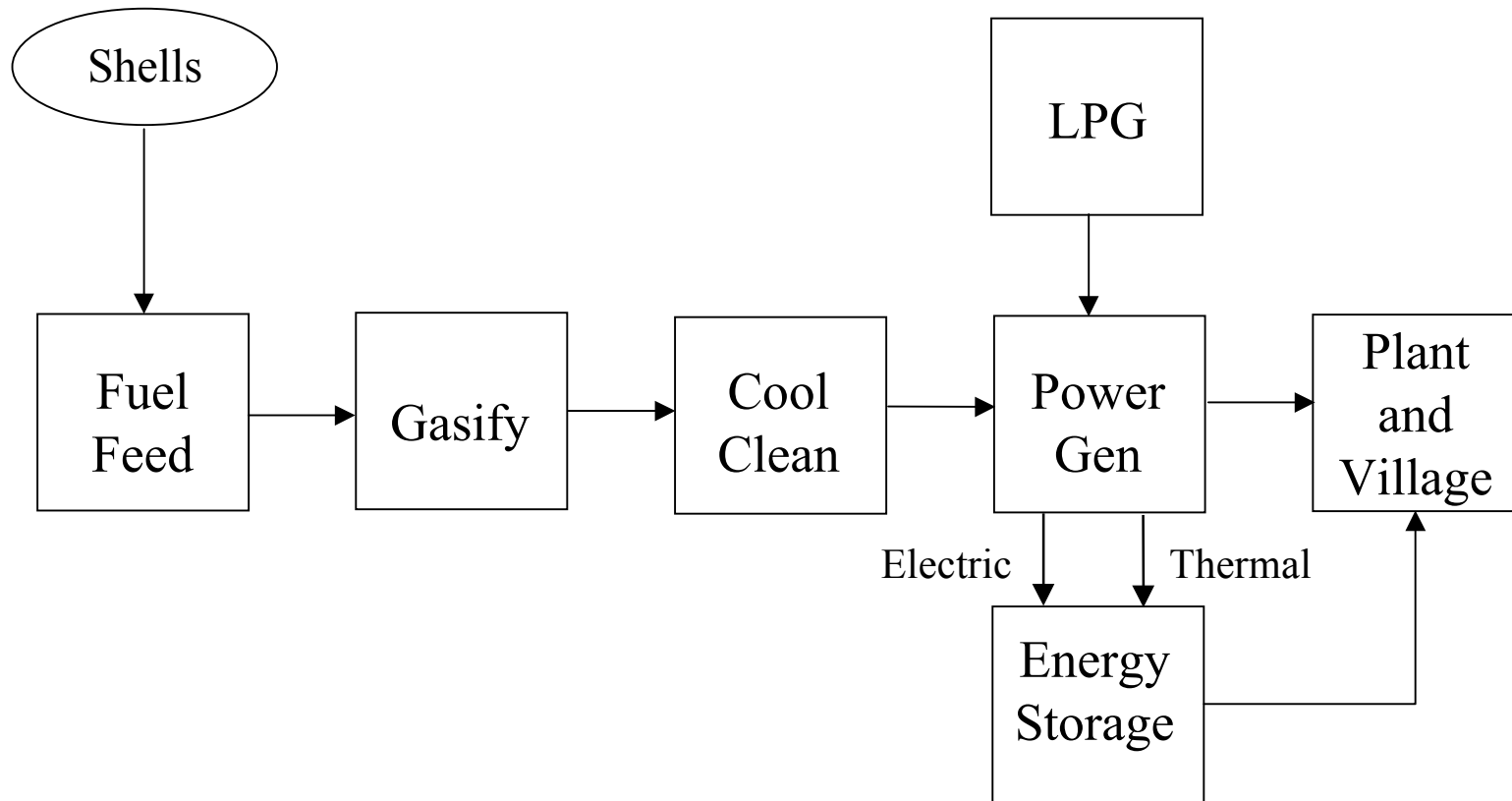
Coir Dust Can Be Compacted to Form Plant Growing Media



Fuel Is A By-Product of Production



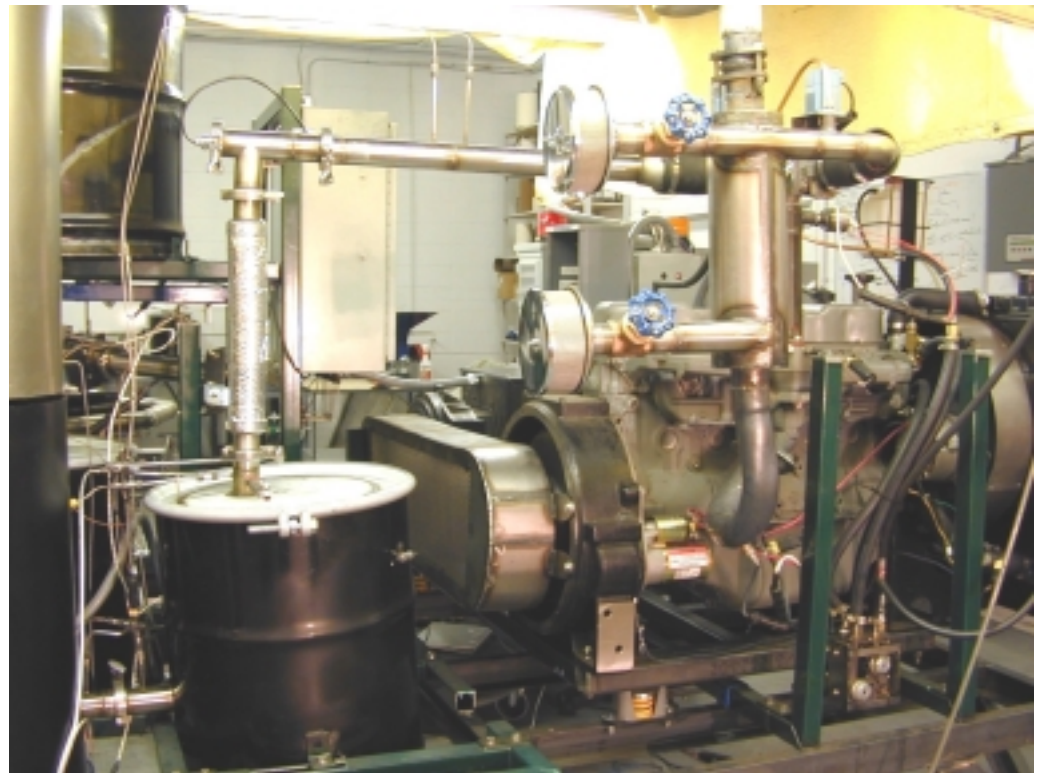
SMB Is A Biomass/LPG Hybrid



CPC's Small Modular Biopower System Enables the Biomass-based RESCO

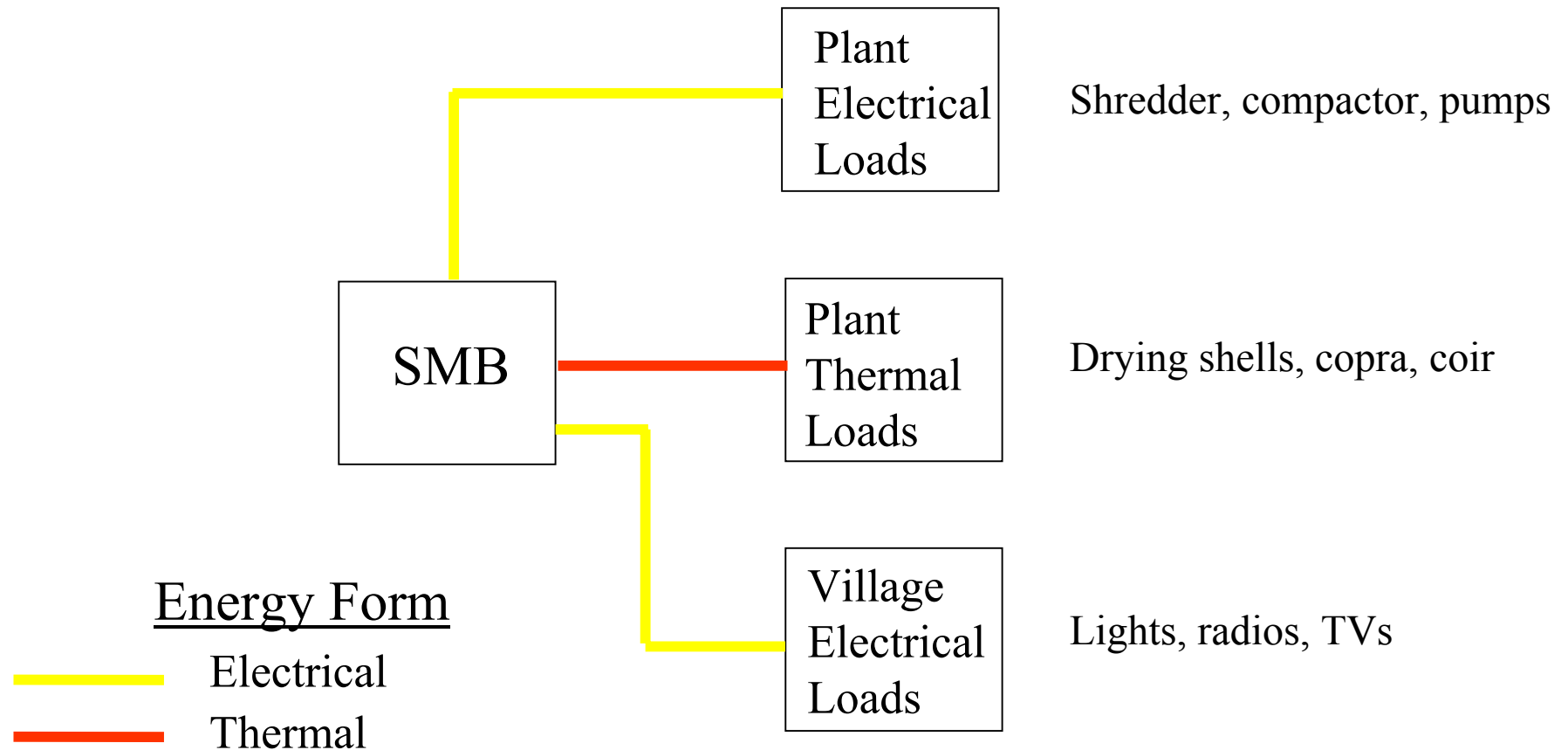
Specifications

- 12 1/2 kW
- 240 VAC, 60 Hz
- Fully automated
- 3:1 turndown ratio
- Parallel with other SMBs
- Skid-mounted, mobile
- <100 ppm tar from gasifier
- 24 hr per day
- Combined heat and power

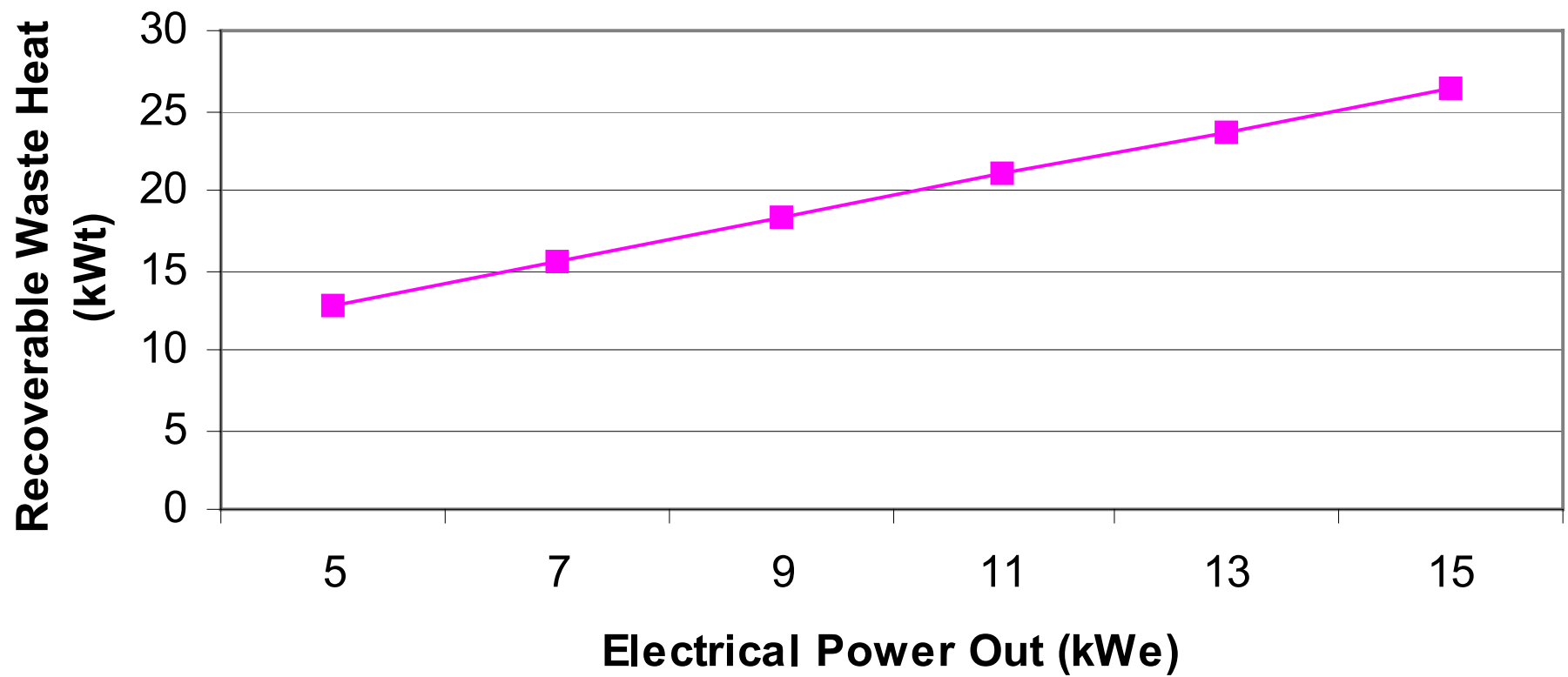


SMB Pre-prototype Endurance Test

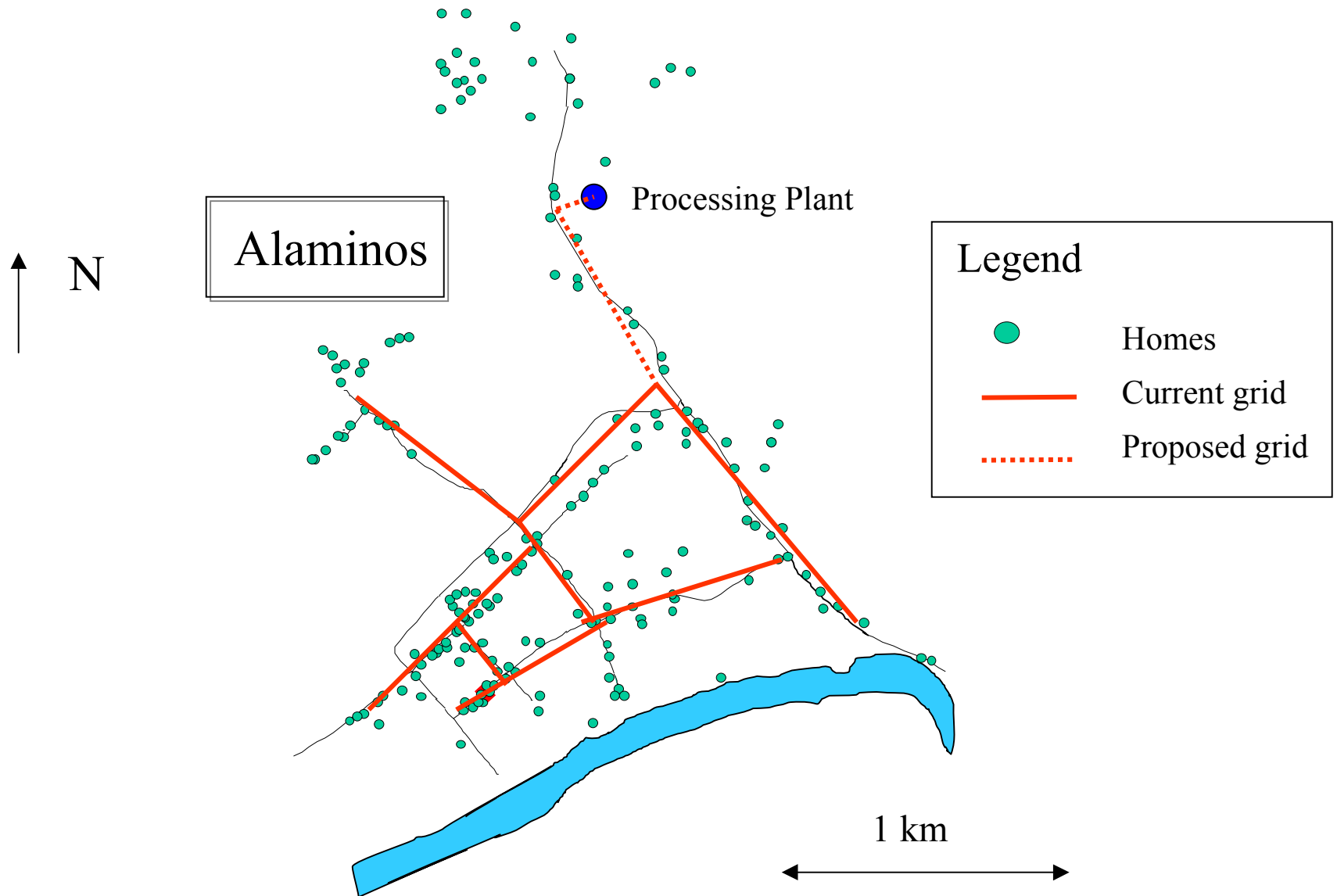
SMB Meets Diverse Energy Requirements



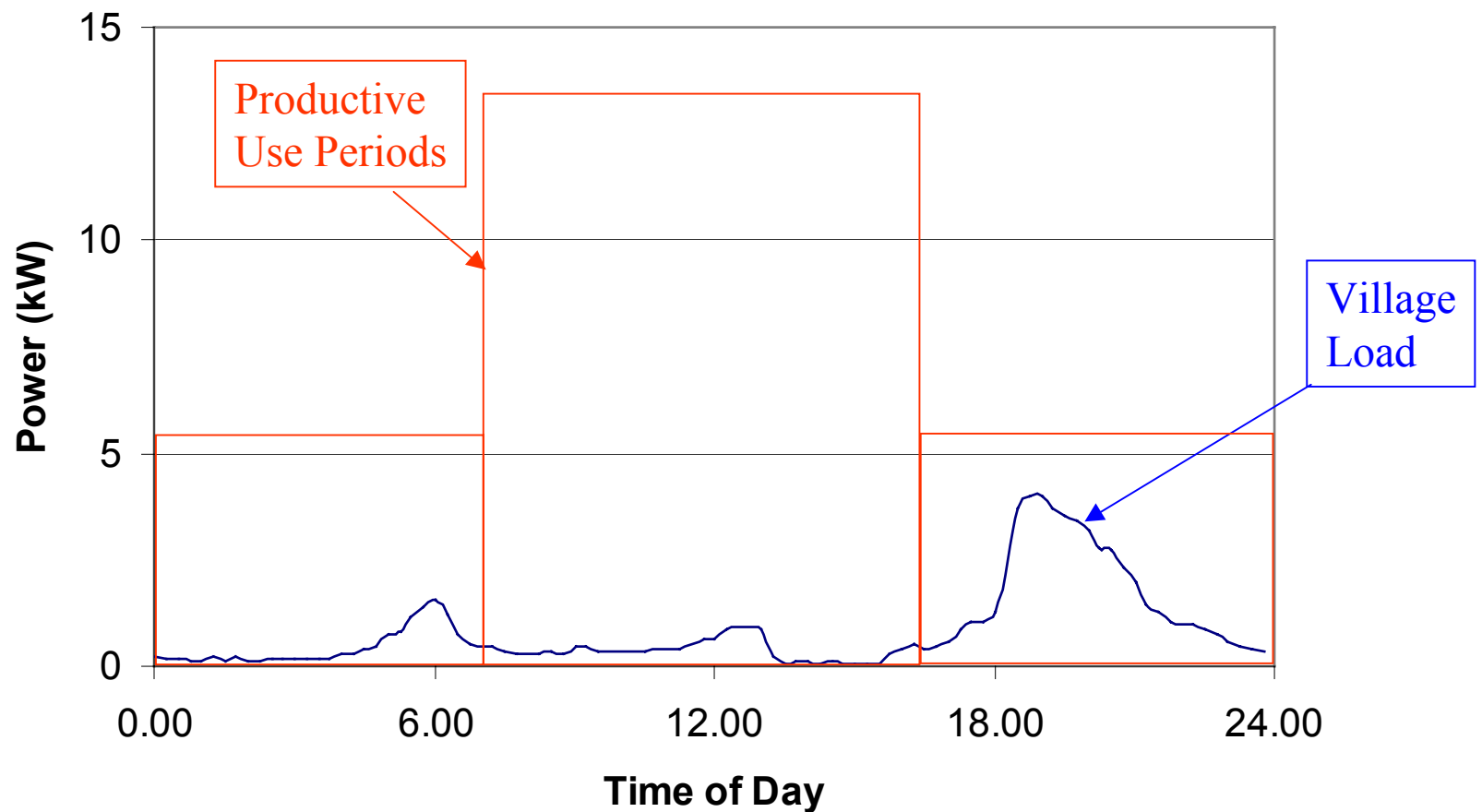
Waste Heat Varies With Electrical Load



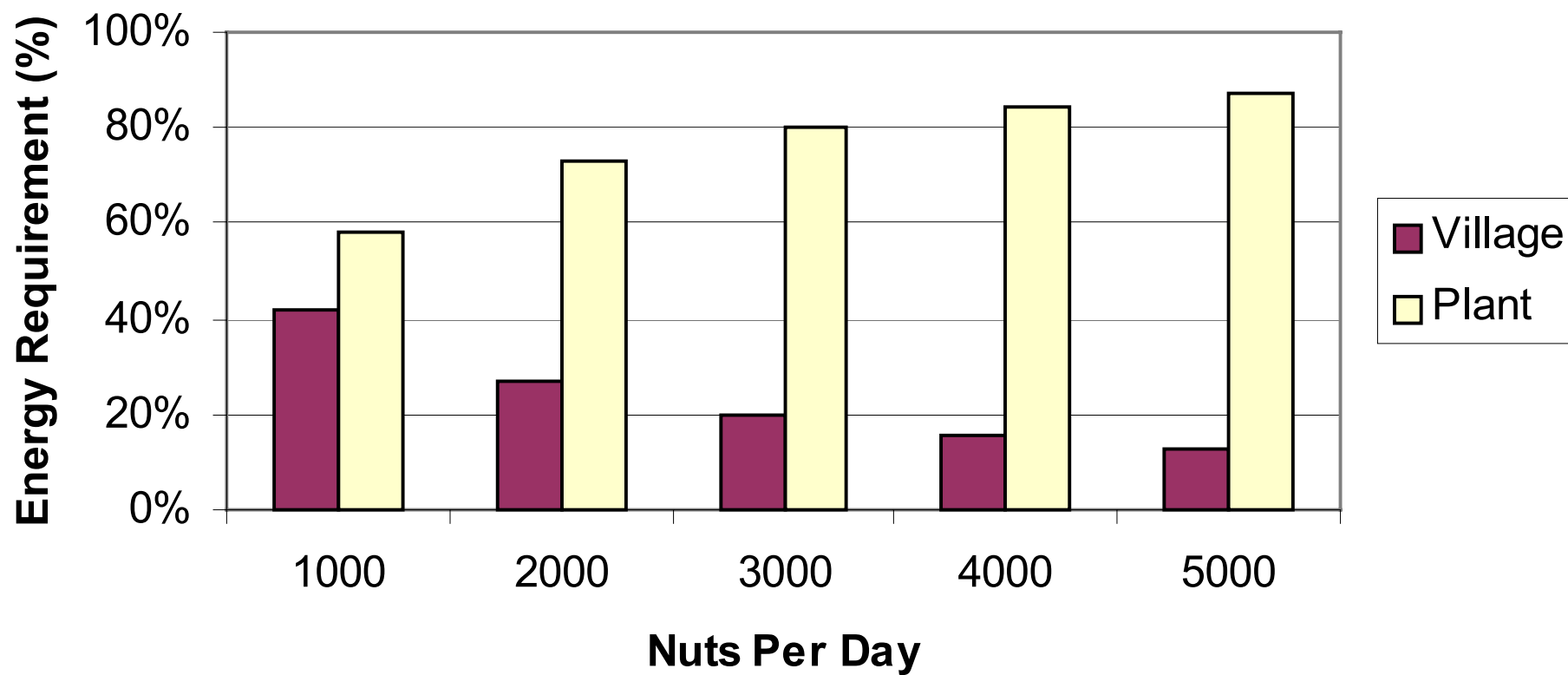
Plant Location Approved By Alaminos Council



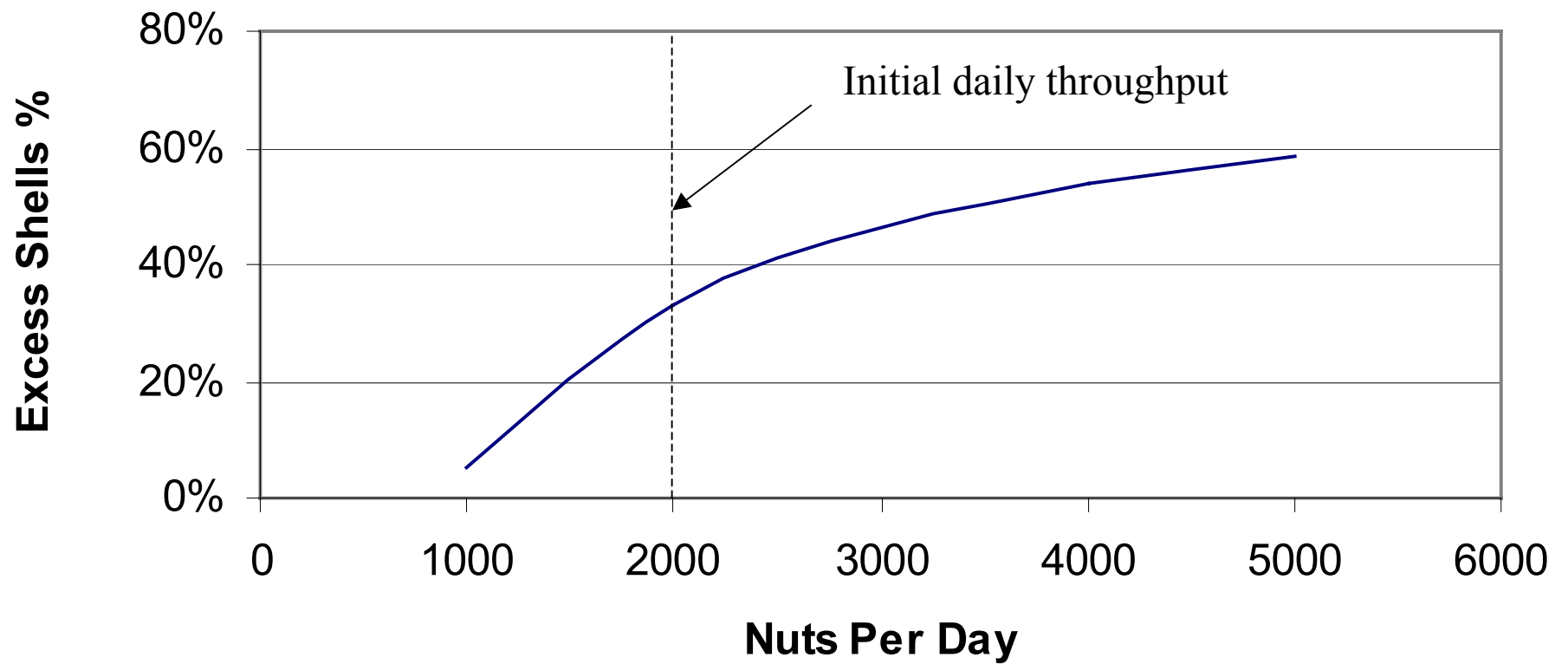
Village and Productive Loads Are Complementary



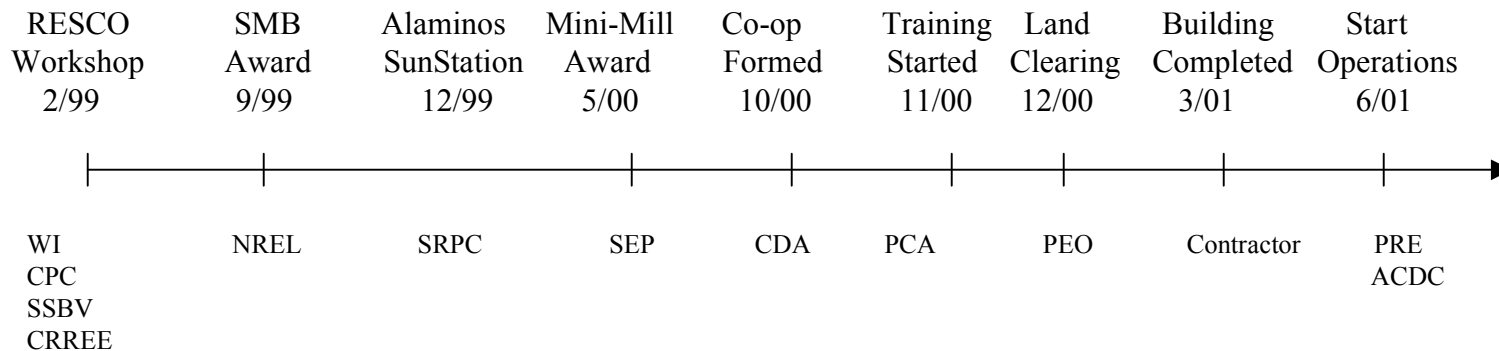
Energy Needs Change With Plant Output



Fuel Supply Exceeds Needs



Timeline of Involvement



Acronym	Organization	Role
• ACDC	Alaminos Coconut Development Cooperative	Business operation
• CDA	Cooperative Development Authority	Coop formation
• CPC	Community Power Corporation	SMB, Process Integration
• CRREE	Center for Renewable Resources and Energy Efficiency	Project Mgt, training
• NREL	National Renewable Energy Laboratory	SMB
• PCA	Philippine Coconut Authority	Technical advisor
• PEO	Provincial Engineering Office	Land Clearing
• PRE	Productive Rural Enterprise	Marketing
• SEP	Sustainable Energy Programme	Mill Project Sponsor
• SSBV	Shell Solar	SMB, RESCO owner
• WI	WINROCK Intl.	Market conditioning

Where are we today?

- SMB endurance testing nearly completed
- Cooperative formed
- Land purchased, clearing started
- Building designed - contract near award
- Training completed
- Test products fabricated

Factors Supporting Growth of Biomass Based RESCOs

- Most unelectrified villages have ag-based economy
- Ag-based productive uses can provide free fuel supply
- Ability to generate large amounts of high quality electrical and thermal energy for both productive use and for village
- Favorable economics: low capital cost, low operating cost, two sources of revenue, local wealth creation
- Large number of heat and power applications

Combined Heat and Power Productive Applications

- Crop Drying
- Cold room
- Grain mill
- Saw mill
- Greenhouse
- Crop irrigation

Biomass RESCO Will Benefit Alaminos

Before

- Husk and shells discarded
- Labor intensive
- No local industry
- Homeowners use kerosene, batteries and small generators

After

- Husk and shells sold to processing plant
- Efficient - frees people for other work
- Locals employed to make and sell products
- Now have AC power, 24 hr per day

Future Home of Alaminos Coconut Development Cooperative

